

*Buffers for Pesticide Application on Non-Fish Bearing (Type N) Streams:* In the January 1998 findings, the federal agencies noted that Oregon had adopted forest practices rules that require aerial spray buffers for most pesticide applications (OAR 629-620-0400(7)(b)). However, these rule changes did not include spray buffers for the aerial application of herbicides along non-fish bearing streams commonly found in headwaters. NOAA and EPA determined that additional management measures to protect non-fish bearing streams during the aerial application of herbicides on forestlands were necessary to achieve and maintain water quality standards and to protect designated uses.

Since 1998, Oregon has provided to the federal agencies several documents describing the programs the State uses to manage pesticides, most recently in March 2014. In addition to the FPA rule buffers noted above, the State also addresses pesticide issues through the Chemical and Other Petroleum Product Rules (OAR 629-620-0000 through 800); Pesticide Control Law (ORS 634); best management practices set by the ODA; and federal pesticide label requirements under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); as well as the State's Water Quality Pesticide Management Plan<sup>1</sup> and Pesticide Stewardship Partnership (PSP) program<sup>2</sup>. In its March 2014 submittal, Oregon noted that it specifically relies on best management practices set by ODA and EPA under FIFRA for the protection of small non-fish bearing streams.

The aerial application of herbicides, such as glyphosate, 2,4-D, atrazine and others, is a common practice<sup>34</sup> in the forestry industry in Oregon. Herbicides are sprayed to control weeds on recently harvested parcels to prevent competition with newly planted tree saplings. In 2008, more than 800,000 pounds of pesticides, the majority of which were herbicides (at least 700,000 pounds) were used for forestry purposes in Oregon<sup>5</sup>. Research has shown that herbicides may adversely impact water quality and designated uses to protect aquatic life<sup>6789</sup>. Herbicides applied through the air commonly reach nearby streams through aerial drift<sup>1011 12</sup> and runoff from the land.<sup>13 14</sup>

<sup>1</sup> ODA, ODEQ, ODF, and OHA. 2011. *Pesticide Management Plan for Water Quality Protection*.

<sup>2</sup> ODEQ. 2012. *Fact Sheet: Pesticide Stewardship Partnerships in Oregon*. DEQ 12-WQ-021. Updated March, 2012

<sup>3</sup> Robert G. Wagner, Michael Newton, Elizabeth C. Cole, James H. Miller, and Barry D. Shiver. 2009. *The role of herbicides for enhancing forest productivity and conserving land for biodiversity in North America*. doi:10.2193/0091-7648(2004)032[1028:TROHFE]2.0.CO;2

<sup>4</sup> Norris, L.A., H.W. Lorz, and S.V. Gregory. 1991. Forest Chemicals. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society Special Publication 19:2-7-296, 1991.

<sup>5</sup> ODA. Pesticide Use Reporting System. 2008 Annual Report. June 2009.

<sup>6</sup> Rick A. Relyea 2005. "The Impact of Insecticides and Herbicides on the biodiversity and productivity of aquatic communities." *Ecological Applications* 15:618–627. <http://dx.doi.org/10.1890/03-5342>; <http://www.esajournals.org/doi/full/10.1890/03-5342>

<sup>7</sup> Relyea, R. and Hoverman, J. (2006), Assessing the ecology in ecotoxicology: a review and synthesis in freshwater systems. *Ecology Letters*, 9: 1157–1171. doi: 10.1111/j.1461-0248.2006.00966.x. <http://onlinelibrary.wiley.com/doi/10.1111/j.1461-0248.2006.00966.x/full>

<sup>8</sup> Hayes, T.B. et al. National Institute of Environmental Health Sciences. 2006. Pesticide mixtures, Endocrine disruption, and amphibian declines: Are we underestimating the impact?. *Environmental Health Perspectives*, doi:10.1289/ehp.8051 (available at <http://dx.doi.org/>) <http://nctc.fws.gov/resources/course-resources/pesticides/Limitations%20and%20Uncertainty/Hayes%20et%20al%20in%20press%20EHP%20mixtures%20January%202006.pdf>

<sup>9</sup> Battaglin, W.A. et al. 2009. The occurrence of glyphosate, atrazine, and other pesticides in vernal pools and adjacent streams in Washington DC, Maryland, Iowa, and Wyoming, 2005-2006. *Environmental Monitoring and Assessment*, vol. 155, 281-307. DOI 10.1007/s10661-008-0435-

Oregon does not require spray buffers for aerial application of herbicides on small, non-fish bearing streams; applicators can spray directly up to and over non-fish bearing streams. In addition, there are no requirements for riparian harvest buffers along small, non-fish bearing streams. For example, in the Triangle Lake area in the Oregon coastal zone management area, there are areas where aerial application of herbicides occurred in areas where timber was harvested to the stream edge.<sup>15</sup> Riparian harvest buffers could serve as defacto spray buffers since they would prevent timber harvesting up to the stream and therefore, would not require herbicide spraying over the non-harvested area to control weeds. Riparian buffers can also help filter any herbicide pollutants from runoff before it reaches the streams.<sup>17 18</sup>

Given that non-fish bearing streams comprise about 70 percent of the total stream length and feed fish-bearing streams, the wide use of herbicides by the forestry industry in coastal Oregon and the lack of any spray or riparian buffers that would help protect non-fish bearing streams from adverse impacts due to the aerial application of herbicides threaten designated uses in Oregon coastal waters. Small, headwater non-fish bearing streams play an important role in delivering cold, clean water to downstream fish-bearing streams<sup>19</sup>. Therefore, it is reasonably foreseeable that Oregon coastal waters are threatened by herbicide pollutants and that additional management measures that will provide greater protection of non-fish bearing streams during the

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y. [http://download.springer.com/static/pdf/861/art%253A10.1007%252Fs10661-008-0435-y.pdf?auth66=1420487219\\_acd0a22105b623694ff637e687270c5c&ext=.pdf](http://download.springer.com/static/pdf/861/art%253A10.1007%252Fs10661-008-0435-y.pdf?auth66=1420487219_acd0a22105b623694ff637e687270c5c&ext=.pdf)

<sup>10</sup> Majewski, M.S., and P.D. Capel. 1996. Pesticides in the Atmosphere: Distribution, Trends, and Governing Factors. Volume 3 of Pesticides in the Hydrologic System Series. Ann Arbor Press, Inc., Chelsea, Michigan 28118, 1997.

<sup>11</sup> F. Van Den Berg, R. Kubiak, W.G. Benjey, M.S. Majewski, S.R. Yates, G.L. Reeves, J.H. Smelt, A.M.A. Van Der Linden. Fate of Pesticides in the Atmosphere: Implications for Environmental Risk Assessment, Emissions of Pesticides into the Air. 1999, pp. 195-218.

<sup>12</sup> D. Pimentel and L. Levitan. Pesticides: amounts applied and amounts reaching pests. Bioscience, Vol. 36, no. 2, 1986.

<sup>13</sup> Gilliom et al. USGS, 2006. The Quality in Our Nation's Water: Pesticides in the Nation's Streams and Groundwater, 1992-2001. Circular 1291. <http://pubs.usgs.gov/circ/2005/1291/pdf/circ1291.pdf>

<sup>14</sup> Larson, S.J., P.D. Capel, and M. Majewski. Pesticides in Surface Waters: Distribution, Trends and Governing Factors. Volume 2 of Pesticides in the Hydrologic System Series. Ann Arbor Press, Inc., Chelsea, Michigan 28118, 1995.

<sup>15</sup> Leinenbach, P. {insert appropriate memo citation when back in office.} USEPA Draft Memo, August 29, 2014. (Update when Peter is back in office.)

<sup>17</sup> Welsch, D.J. USDA Forest Service. 1991. Riparian Forest Buffers: Function and Design for Protection and Enhancement of Water Resources. NA-PR-07-91.

[https://books.google.com/books?hl=en&lr=&id=rpSNdMJz4XQC&oi=fnd&pg=PP3&dq=buffer+pesticide+forestry&ots=77TENrS6TQ&sig=BH\\_zajspVcRveXtEcGq17vZeFE#v=onepage&q=buffer%20pesticide%20forestry&f=false](https://books.google.com/books?hl=en&lr=&id=rpSNdMJz4XQC&oi=fnd&pg=PP3&dq=buffer+pesticide+forestry&ots=77TENrS6TQ&sig=BH_zajspVcRveXtEcGq17vZeFE#v=onepage&q=buffer%20pesticide%20forestry&f=false)

<sup>18</sup> Kiffney, P.M., J.S. Richardson, J.P. Bull. 2003. Responses of periphyton and insects to experimental manipulation of riparian buffer width along forest streams. Journal of Applied Ecology, 2003. Volume 40, 1060-1076. <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2664.2003.00855.x/pdf>

<sup>19</sup> Gomi, T., R.C. Sidle, and J.S. Richardson. 2002. Understanding Processes and Downstream Linkages of Headwater Systems. Bioscience, October 2002, Vol. 52, No. 10. <http://bioscience.oxfordjournals.org/content/52/10/905.short>

aerial application of herbicides are warranted to achieve water quality standards and protect designated uses (CZARA Sec. 6127(b)(1)(B), 16 U.S.C. 1455b).

Other recent studies and reports also support NOAA and EPA's determination that additional management measures for forestry are needed to address aerial herbicide application due to a reasonable, foreseeable threat to coastal waters and designated uses. One of the common indirect adverse effects on water quality and designated uses, particularly cold water fisheries uses, occurs because herbicides can reduce the growth and biomass of primary producers (algae and phytoplankton) that form the base of the aquatic food chain. A decrease in primary production (e.g., plants, algae) can have significant effects on consumers (e.g., salmonids or other animals that eat food to get energy) that depend on the primary producers for food.<sup>20</sup> These effects are often reported at herbicide concentrations well below concentrations that would have a direct effect on consumers. In addition, there are concerns about the increased toxicity of mixtures of herbicides and other pesticides to aquatic organisms<sup>21 22 23</sup>. Although the NOAA National Marine Fisheries Services' (NMFS) biological opinion (BiOp) for several EPA herbicide labels, including 2,4-D,<sup>24</sup> discusses that it is difficult to predict the magnitude and duration these impacts would have on juvenile salmon because the extent of salmonid effects often depend on the interaction with many different parameters, such as availability of alternative food sources, water temperature, and other abiotic factors, NMFS concluded that products containing 2,4-D are likely to jeopardize the existence of all listed salmonids and adversely modify or destroy critical habitat.

A few studies have indicated that the aerial application of herbicides may not result in herbicides exceeding toxic thresholds for humans or aquatic life in fish-bearing and drinking water streams,<sup>27</sup> at the interface of fish and non-fish bearing streams, or drinking water facilities in Oregon. However, none of these studies were focused on impacts to non-fish bearing streams and do not provide sufficient evidence, based on other information, that coastal waters and designated uses are not reasonably or foreseeably threatened by the aerial application of herbicides over non-fish bearing streams. For example, an ODF study which looked at the effectiveness of forest practices act aerial spray buffers for herbicides and fungicides on fish bearing streams \*\*\*, stated that they could not draw any conclusions about the FPA's effectiveness at protecting water quality for non-fish bearing streams. A USGS study in the McKenzie River basin, looked broadly at urban, forestry and agriculture pesticide use and the

<sup>20</sup> Laurie B. Marczak, Takashi Sakamaki, Shannon L. Turvey, Isabelle Deguise, Sylvia L. R. Wood, and John S. Richardson 2010. Are forested buffers an effective conservation strategy for riparian fauna? An assessment using meta-analysis. *Ecological Applications* 20:126–134.

<sup>21</sup> Relyea, R.A. A Cocktail of Contaminants: How mixtures of pesticides at low concentrations affect aquatic communities. *Oecologia*, March 2009, Volume 159, Issue 2, pp 363-376.

<sup>22</sup> Gilliom et al, 2006. Ibid.

<sup>23</sup> Carpenter, K.D., S. Sobieszcyk, A. Arnsberg, and F.A. Rinella. USGS. 2008. Pesticide Occurrence and Distribution in the Lower Clackamas River Basin, Oregon, 2000-2005. Scientific Investigations Report 2008-5027.

<sup>24</sup> NMFS. 2011. *National Marine Fisheries Service Endangered Species Act Section 7 Consultation Biological Opinion Environmental Protection Agency Registration of Pesticides 2,4-D, Triclopyr BEE, Diuron, Linuron, Captan, and Chlorothalonil*. NOAA National Marine Fisheries Service, June 30, 2011.

<sup>27</sup> Dent L. and J. Robben. 2000. *Oregon Department of Forestry: Aerial Pesticide Application Monitoring Final Report*. Oregon Department of Forestry, Pesticides Monitoring Program. Technical Report 7. March 2000.

impacts on drinking water. The study, which took place outside the coastal nonpoint management area, also notes that forestry sampling was inconsistent because of irregular and intermittent pesticide application patterns among tributaries and the difficulty of capturing runoff events in the spring after application<sup>28</sup>.

Oregon relies on the national best management practices established through the federal FIFRA pesticide labels to protect non-fish bearing streams. Currently, EPA, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture are working to improve the national risk assessment process to include all ESA-listed species when registering all pesticides, including herbicides. Given the scale of this undertaking, the federal agencies are employing a phased, iterative approach over the next 15 years to make the changes, and it is expected that herbicide labels will not be updated until the end of the 15-year process. This ongoing federal process, however, should not preclude Oregon from making needed state-level improvements to how it manages herbicides in the context of its forestry landscape and sensitive species.

Oregon and other Pacific Northwest states have recognized the need to go beyond the national FIFRA label requirements to protect water quality and designated uses, including salmon, in their state.<sup>30</sup> Oregon has 60-foot spray buffers for non-biological insecticides and fungicides on non-fish bearing streams (OAR 629-620-400(7)) and 60-foot spray buffers for herbicides on wetlands, fish-bearing and drinking water streams (OAR 629-620-400(4)). Other Pacific Northwest states have established more stringent forestry spray buffer requirements for herbicides along non-fish bearing streams. For example, for smaller non-fish bearing streams, Washington maintains a 50-foot riparian and spray buffer (WAC-222-38-040). Idaho has riparian and spray buffers for non-fish bearing streams of 100 feet (IAR 20-02-01). California sets riparian buffers for non-fish bearing streams after consulting with the local forester, which implicitly restrict the aerial application of herbicides near the stream.

Though Oregon has neither spray nor riparian harvest buffers for herbicides that are aerially applied on non-fish bearing streams, the ODA Pesticide Division requires applicators to attend trainings and obtain licenses prior to spraying pesticides. ODF requires pesticide applicators to complete a Notification of Operation at least 15 days before applying on forestlands<sup>31</sup> and to maintain a daily chemical application form<sup>32</sup>. On the form, the applicators must list which pesticides *may* be applied, the stream segments on which these pesticides *may* be applied, and when application *may* occur within a 2-3 month period. However, the notification form does not specify when application will occur within a 1-2 week period, and post-application which

<sup>28</sup> Kelly, V.J., C.W. Anderson, and K. Morgenstern. 2012. USGS and Eugene Water and Electric Board. Reconnaissance of Land-Use Sources of Pesticides in Drinking water, McKenzie River Basin, Oregon. Scientific Investigations Report 2012-5091.

<sup>30</sup> Peterson, E. EPA. 2011. Memo to Scott Downey, EPA and David Powers, EPA RE: *Comparative Characterization of Pacific Northwest Forestry Requirements for Aerial Application of Pesticides*. August 30, 2011.

<sup>31</sup> <https://ferns.odf.state.or.us/E-Notification>

<sup>32</sup> Oregon Department of Forestry. "Daily Chemical Application Record Form." Revised September 2013. [http://www.oregon.gov/odf/privateforests/docs/ChemicalApplicationForm\\_Final.pdf](http://www.oregon.gov/odf/privateforests/docs/ChemicalApplicationForm_Final.pdf)

pesticides were applied and how much. The form also reminds the applicator of the required spray buffers for fish-bearing and drinking water streams, but does not specify protections for non-fish bearing streams or voluntary best practices included in the [insert proper name of state guidance discussed below] that should be followed.

Oregon's broader strategy for cross program coordination on pesticides includes its Water Quality Pesticide Management Plan, PSP program, and Pesticide Analytical and Response Center (PARC). NOAA and EPA acknowledge the progress Oregon has made in its establishment of a multi-agency management team to assess and manage pesticide water quality issues. However, as these efforts apply to the aerial application of herbicides in the coastal nonpoint management area, the federal agencies note that water quality monitoring data on pesticides is still limited in the State, and that Oregon has only established eight PSP monitoring areas in seven watersheds, none of which are within the coastal nonpoint management area. While NOAA and EPA recognize that the PSP program targets the most problematic or potentially problematic watersheds, and Oregon received recent funding to expand into two new watersheds, the agencies believe that if monitoring data are to drive adaptive management, the State should develop and maintain more robust and targeted studies of the effectiveness of its pesticide monitoring and best management practices within the coastal nonpoint management area. The federal agencies encourage the State to design its monitoring program in consultation with EPA and NMFS.

NOAA and EPA believe that Oregon could develop additional management measures for forestry that will protect non-fish bearing streams during the aerial application of herbicides to achieve water quality standards and protect designated uses through a variety of mechanisms. Some potential approaches could include one or more of the following elements:

- Adopt rules that would require spray buffers for the aerial application of herbicides along non-fish bearing streams. Oregon may wish to look toward spray buffer requirements neighboring states have established for ideas.
- Adopt no-cut riparian buffers for timber harvest along non-fish bearing streams, which, by default, would also provide a buffer during aerial spraying.
- Expand existing guidelines for voluntary buffers or buffer protections for the aerial application of herbicides on non-fish bearing streams.
- Educate and train aerial applicators of herbicides on the new guidance and how to minimize aerial drift to waterways, including non-fish bearing streams;
- Revise the ODF Notification of Operation form required prior to chemical applications on forestlands to include a check box for aerial applicators to indicate they must adhere to FIFRA labels for all stream types, including non-fish bearing streams;
- Revise the ODF Notification of Operation form to refer applicators to the XXX guidelines for additional recommended best practices they should follow during application. - JW need to look into this, but good suggestion.
- Track and evaluate the implementation of voluntary measures for the aerial application of herbicides along non-fish bearing streams to assess the effectiveness of these practices, and if adjustments are needed, to achieve water quality standards and protect designated uses;

- Provide better maps of non-fish bearing streams and other sensitive sites and structures to increase awareness of these sensitive areas that need protection among the aerial applicator community; and
- Encourage the use of GPS technology, linked to maps of non-fish bearing streams, to automatically shut off nozzles before crossing non-fish bearing streams.

If Oregon chooses a voluntary approach, the State would also need to meet the other CZARA requirements for using voluntary, incentive-based programs as part of the State's coastal nonpoint program. This includes a description of the methods the state will use to track and evaluate those voluntary programs, a legal opinion stating it has the necessary back-up authority to require implementation of the voluntary measures, a description of the process that links the implementing agency with the enforcement agency, and a commitment to use the existing enforcement authorities, where necessary.

[Note:

FYI: see some interesting weblinks on aerial application of herbicides and impacts to people on the Oregon coast. See legislation in the works on pesticides.

<http://www.hcn.org/issues/46.19/timberland-herbicide-spraying-sickens-a-community> - Nov. 10, 2014 article on forestry and herbicides.

<http://earthfix.opb.org/energy/article/legislation-in-works-for-oregon-herbicide-spraying/>

[http://www.pbs.org/newshour/bb/environment-july-dec12-forests\\_09-12/](http://www.pbs.org/newshour/bb/environment-july-dec12-forests_09-12/)

<http://www.theatlantic.com/national/archive/2012/08/in-oregon-residents-struggle-to-solve-a-pesticide-mystery/261083/2>]

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Buffers for Pesticide Application on Non-Fish Bearing (Type N) Streams: In the January 1998 findings, the federal agencies noted that Oregon had published adopted forest practices rules that require aerial spray buffers zones for most pesticide applications (OAR 629-620-0400(7)(b)). However, these rule changes did not include spray buffers for the aerial application of herbicides along non-fish bearing streams commonly found in headwaters. NOAA and EPA determined that additional management measures applicable to protect non-fish bearing streams during stream spray buffers for the aerial application of herbicides on non-fish bearing streams on forestlands were necessary to achieve and maintain water quality standards and to protect designated uses.

Since 1998, Oregon has provided to the federal agencies several documents describing the programs upon which the State relies on uses to manage pesticides, most recently in March 2014. In addition to the FPA rule buffers noted above, the State also addresses pesticide issues through the Chemical and Other Petroleum Product Rules (OAR 629-620-0000 through 800); Pesticide Control Law (ORS 634); best management practices set by the ODA; and federal pesticide label requirements under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); as well as the State's Water Quality Pesticide Management Plan<sup>1</sup> and Pesticide Stewardship Partnership (PSP) program<sup>2</sup>. In its March 2014 submittal, Oregon noted that it specifically relies on best management practices set by ODA and EPA under FIFRA for the protection of small non-fish bearing streams.

The Aerial application of herbicides, such as glyphosate, 2,4-D, atrazine, and others, is a common practice<sup>3,4</sup> in the forestry industry in Oregon. Herbicides are sprayed to control weeds on recently harvested parcels to prevent competition with newly planted tree saplings. In 2008, more than 800,000 pounds of pesticides, the majority of which were herbicides (at least 700,000 pounds) were used for forestry purposes in Oregon<sup>5</sup>. Research has shown that the aerial application of herbicides may adversely impact water quality and designated uses to protect aquatic life<sup>6,7,8,9</sup>, including supporting salmonids that protect salmon.<sup>10,11,12</sup> Herbicides

<sup>1</sup> ODA, ODEQ, ODF, and OHA. 2011. *Pesticide Management Plan for Water Quality Protection*.

<sup>2</sup> ODEQ. 2012. *Fact Sheet: Pesticide Stewardship Partnerships in Oregon*. DEQ 12-WQ-021. Updated March, 2012.

<sup>3</sup> Robert G. Wagner, Michael Newton, Elizabeth C. Cole, James H. Miller, and Barry D. Shiver. 2009. *The role of herbicides for enhancing forest productivity and conserving land for biodiversity in North America*. doi:10.2193/0091-7648(2004)032[1028:TROHFE]2.0.CO;2

<sup>4</sup> Norris, L. A., H.W. Lorz, and S.V. Gregory. 1991. Forest Chemicals. Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Society Special Publication 19:2-7-296, 1991.

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<sup>6</sup> Rick A. Relyea 2005. "The Impact of Insecticides and Herbicides on the biodiversity and productivity of aquatic communities." *Ecological Applications* 15:618-627. <http://dx.doi.org/10.1890/03-5342>; <http://www.esajournals.org/doi/full/10.1890/03-5342>

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Ex. 5 - Attorney Client

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Comment [AC4]: Is this in a document ... [4]

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applied through the air commonly reach nearby streams through aerial drift<sup>1011A-B</sup> and runoff from the land.<sup>13 14C; D</sup>

Oregon does not require spray buffers for aerial application of herbicides on small, non-fish bearing streams; applicators can spray directly up to and over non-fish bearing streams. In addition to the lack of spray buffers, there are also no requirements for riparian harvest buffers for along small, non-fish bearing streams. For example, in the Triangle Lake area in the Oregon coastal zone management area, there are areas where aerial application of herbicides occurred in areas where timber was harvested to the stream edge.<sup>15</sup> Approximately XX tons/year were aerially applied in the Triangle Lake area alone<sup>16</sup> {include more specifics from Peter's memo and potentially commenters.} Riparian harvest buffers could serve as defacto spray buffers since they would prevent timber harvesting up to the stream and therefore, would not require herbicide spraying over the non-harvested area to control weeds. Riparian buffers can also help filter any herbicide pollutants from runoff before it reaches the streams.<sup>17A,B,C9</sup> {I have a number here I can put in for references in the 2000s by Richardson} That means, it is possible for aerial application of herbicides to occur in areas with no riparian area near streams leading to direct delivery of herbicides to non-fish bearing streams. (include citations several general ones on importance of riparian buffers to improving water quality and reducing pesticide levels).

<sup>9</sup> Battaglin, W.A. et al. 2009. The occurrence of glyphosate, atrazine, and other pesticides in vernal pools and adjacent streams in Washington DC, Maryland, Iowa, and Wyoming, 2005-2006. Environmental Monitoring and Assessment, vol. 155, 281-307. DOI 10.1007/s10661-008-0435-y. [http://download.springer.com/static/pdf/861/art%253A10.1007%252Fs10661-008-0435-y.pdf?auth66=1420487219\\_acd0a22105b623694ff637e687270c5c&ext=.pdf](http://download.springer.com/static/pdf/861/art%253A10.1007%252Fs10661-008-0435-y.pdf?auth66=1420487219_acd0a22105b623694ff637e687270c5c&ext=.pdf)

<sup>10</sup> Majewski, M.S., and P.D. Capel. 1996. Pesticides in the Atmosphere: Distribution, Trends, and Governing Factors. Volume 3 of Pesticides in the Hydrologic System Series. Ann Arbor Press, Inc., Chelsea, Michigan 28118, 1997.

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<sup>16</sup> A.A.

<sup>17</sup> Welsh, D.J. USDA Forest Service. 1991. Riparian Forest Buffers: Function and Design for Protection and Enhancement of Water Resources. NA-PR-07-91. [https://books.google.com/books?hl=en&lr=&id=rpSNdMJz4XQC&oi=fnd&pg=PP3&dq=buffer+pesticide+forestry&ots=77TENrS6TQ&sig=BH\\_zajspVcRveXtEcGq17vZefE#v=onepage&q=buffer%20pesticide%20forestry&f=false](https://books.google.com/books?hl=en&lr=&id=rpSNdMJz4XQC&oi=fnd&pg=PP3&dq=buffer+pesticide+forestry&ots=77TENrS6TQ&sig=BH_zajspVcRveXtEcGq17vZefE#v=onepage&q=buffer%20pesticide%20forestry&f=false)

<sup>18</sup> Kiffney, P.M., J.S. Richardson, J.P. Bull. 2003. Responses of periphyton and insects to experimental manipulation of riparian buffer width along forest streams. Journal of Applied Ecology. 2003. Volume 40, 1060-1076. <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2664.2003.00855.x/pdf>

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Comment [AC9]: Provide citation or two that specifically supports this point. -jw - same as above. will be working on this over the break.

Comment [AC10]: Provide citation or two that specifically supports this point. The ... [39]

Comment [JW11]: Jenny, include sit ... [40]

Comment [AC12]: I liked this way of ... [41]

Comment [AC13]: As you note in the ... [42]

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Given that ~~The universe of non-fish bearing streams is significant in the coastal nonpoint management area comprising at least about 70 percent of the total stream length and feed fish-bearing streams.~~ the wide use of herbicides by the forestry industry in coastal Oregon, and ~~the lack of any spray or riparian buffers that would help protect non-fish bearing streams from adverse impacts due to the aerial application of herbicides. Therefore, threaten designated uses in Oregon coastal waters.~~ Small, headwater non-fish bearing streams play an important role in delivering cold, clean water to downstream fish-bearing streams<sup>19</sup>. Therefore, it is reasonably foreseeable that Oregon coastal waters are threatened by herbicide pollutants and that additional management measures that will provide greater protection of non-fish bearing streams during the aerial application of herbicides are warranted to achieve water quality standards and protect designated uses (CZARA Sec. 6127(b)(1)(B), 16 U.S.C. 1455b). ~~delivering cold water and large woody debris to fish-bearing streams.~~

Other recent studies and reports also support NOAA and EPA's determination that additional management measures for forestry are needed to address aerial herbicide application due to a reasonable, foreseeable threat to coastal waters and designated uses. One of the common indirect adverse effects on water quality and designated uses, particularly cold water fisheries uses, occurs because herbicides can reduce the growth and biomass of primary producers (algae and phytoplankton) that form the base of the aquatic food chain. A decrease in primary production (e.g., plants, algae) can have significant effects on consumers (e.g., salmonids or other animals that eat food to get energy) that depend on the primary producers for food. ~~(Richardson, Taylor, Schluter, Pearson, & Hatfield, 2010<sup>20</sup>).~~ These effects are often reported at herbicide concentrations well below concentrations that would have a direct effect on consumers.<sup>21</sup> In addition, there are concerns about the increased toxicity of mixtures of herbicides and other pesticides to aquatic organisms<sup>22 22 23</sup>. ~~Although the In the NOAA National Marine Fisheries Services' (NMFS) biological opinion (BiOp) for several EPA herbicide labels, including 2,4-D, aerial drift was identified as the most likely pathway for these herbicides to enter aquatic habitats.<sup>24</sup> (Check p. 377 of BiOps. Note starting on page 454, could cite to herbicides primary and secondary effects on fish, macros, terrestrials. Page 461 looks at effects on salmon habitat.)~~

<sup>19</sup> Gomi, T., RC, Sidle, And JS Richardson. 2002. Understanding Processes and Downstream Linkages of Headwater Systems. Bioscience, October 2002, Vol. 52, No. 10. <http://bioscience.oxfordjournals.org/content/52/10/905.short>

<sup>20</sup> Laurie B. Marczak, Takashi Sakamaki, Shannon L. Turvey, Isabelle Deguise, Sylvia L. R. Wood, and John S. Richardson 2010. Are forested buffers an effective conservation strategy for riparian fauna? An assessment using meta-analysis. *Ecological Applications* 20:126–134. <http://dx.doi.org/10.1890/08.2064.1>

<sup>21</sup> Relyea, R.A. A Cocktail of Contaminants: How mixtures of pesticides at low concentrations affect aquatic communities. *Oecologia*, March 2009, Volume 159, Issue 2, pp 363–376.

<sup>22</sup> Gilliom et al. 2006. Ibid.

<sup>23</sup> Carpenter, K.D., S. Sobieszcyk, A. Amsberg, and F.A. Rinella. USGS. 2008. Pesticide Occurrence and Distribution in the Lower Clackamas River Basin, Oregon, 2000–2005. Scientific Investigations Report 2008-5027.

<sup>24</sup> NMFS. 2011. *National Marine Fisheries Service Endangered Species Act Section 7 Consultation Biological Opinion Environmental Protection Agency Registration of Pesticides 2,4-D, Triclopyr BEE, Diauron, Linuron, Captan, and Chlorothalonil*. NOAA National Marine Fisheries Service, June 30, 2011.

**Comment [AC14]:** An older version said 60-70% should we say about to give us more wiggle room? JW- makes sense. I've seen numbers vary from 60-80%, but 70% seems like pretty much everyone would agree to that.

**Comment [AC15]:** As laid out in the statute, there are two triggers for add MMs: (1) failure to attain WQS etc. and (2) where coastal waters are threatened by reasonably foreseeable increases in pollution loadings from new or expanding sources. The 2<sup>nd</sup> trigger is why we required add MMs in this case so could strengthen our rationale by mirroring that lang. from the statute here. JW – great find. This aligns well with our argument.

**Comment [AC16]:** True statements but cold water and LWD is irrelevant for this discussion on herbicide spraying since spraying does not impact those factors.

## Ex. 5 - Attorney Client

**Comment [AC18]:** Per citation format, we do not reference authors in text. - jw - okay

**Comment [AC19]:** Delete web address from article in footnote. Inconsistent with oth ... [44]

**Comment [AC20]:** Include citation? Does Richardson, et.al. address this too? I ref ... [45]

## Ex. 5 - Deliberative

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NMFS also noted that runoff was likely pathway for 2,4-D. One of the common indirect adverse effects on water quality and designated uses, particularly cold water fisheries uses, occurs because herbicides can reduce the growth and biomass of primary producers (algae and phytoplankton) that form the base of the aquatic food chain. A decrease in primary production can have significant effects on consumers (e.g., salmonids) that depend on the primary producers for food (Richardson, Taylor, Schluter, Pearson, & Hatfield, 2010<sup>25</sup>). These effects are often reported at herbicide concentrations well below concentrations that would have a direct effect on consumers. The BiOp discusses that it is difficult to predict the magnitude and duration these impacts would have on juvenile salmon because the extent of salmonid effects often depend on the interaction with many different parameters, such as availability of alternative food sources, water temperature, and other abiotic factors. NMFS concluded that products containing 2,4-D are likely to jeopardize the existence of all listed salmonids and adversely modify or destroy critical habitat.

**Comment [SS22]:** Cite to whoever they cited to, not to NMFS.

## Ex. 5 - Attorney Client

**Comment [SS24]:** Same comment

## Ex. 5 - Attorney Client

Research has shown that the aerial application of herbicides may adversely impact water quality and designated uses that protect salmon. As discussed in EPA's *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*<sup>26</sup>, the condition for forest chemical management is to "use chemicals when necessary for forest management in accordance with the following to reduce nonpoint source pollution impacts due to the movement of forest chemicals off-site during and after application: (4) Establish and identify buffer areas for surface waters. (This is especially important for aerial applications.)" EPA's 1993 guidance cites studies from various sources on aerial application of herbicides (Norris and Moore, 1971; Riekerk et al., 1989; Norris et al., 1991).

**Comment [AC28]:** I've mentioned this before and feel very strongly about this. Referencing the standard forestry (g) measure for pesticides has no place in this rationale for add MMs and just confuses things. Please remove this permanently. JW - agreed. Will use Norris et al citation 1991 for earlier references supporting impacts of aerial application of herbicides.

**Comment [L29]:** Not clear what the point of this study is – that data exist?

## Ex. 5 - Attorney Client

**Comment [AC31]:** Dent et al.

**Comment [AC32]:** PCW

**Comment [AC33]:** USGS

**Comment [JW34]:** Note that the study talks about 3 type N streams that were sampled, but that all of these had riparian harvest buffers which the study acknowledges is not required. "These Type N streams had overstory vegetative buffers, a practice not required for Type N streams." page 2. It gets comp[ ... [49]

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A few studies have indicated that the aerial application of herbicides may not result in herbicides exceeding toxic thresholds for humans or aquatic life in fish-bearing and drinking water streams.<sup>27</sup> at the interface of fish and non-fish bearing streams, or drinking water facilities in Oregon.<sup>28</sup> However, none of these studies were focused on impacts to non-fish bearing streams and do not provide sufficient evidence, based on other information, that coastal waters and designated uses are not reasonably or foreseeably threatened by the aerial application of herbicides over non-fish bearing streams. For example, an ODF study which looked at the effectiveness of forest practices act aerial spray buffers for herbicides and fungicides on fish bearing streams and on fungicides and rodenticides on non-fish bearing streams<sup>\*\*\*</sup>, stated that they could not draw any conclusions about the EPA's effectiveness at protecting water quality for non-fish bearing streams. A 2010 USGS study in the McKenzie River basin, which looked

<sup>25</sup> Laurie B. Marczak, Takashi Sakamaki, Shannon L. Turvey, Isabelle Deguise, Sylvia L. R. Wood, and John S. Richardson 2010. Are forested buffers an effective conservation strategy for riparian fauna? An assessment using meta-analysis. *Ecological Applications* 20:126–134. <http://dx.doi.org/10.1890/08-2064.1>

<sup>26</sup> EPA. 1993. *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*. EPA-840-B-92-002. Environmental Protection Agency, January 1993.

<sup>27</sup> Dent L. and J. Robben. 2000. *Oregon Department of Forestry. Aerial Pesticide Application Monitoring Final Report*. Oregon Department of Forestry, Pesticides Monitoring Program. Technical Report 7. March 2000.

broadly at urban, forestry and agriculture pesticide use and the impacts on drinking water. The study, which took place outside the coastal nonpoint management area, also notes that forestry sampling was inconsistent because of irregular and intermittent pesticide application patterns among tributaries and the difficulty of capturing runoff events in the spring after application<sup>28</sup>; and did not time sampling with spray events to observe potential spikes in herbicide levels in the water that may occur soon after application.

~~found several detections of pesticides associated with urban stormwater, but the study was conducted outside the coastal zone management area.~~

There have been few peer-reviewed studies that have specifically evaluated the extent and effects of aerial application of herbicides in Oregon's coastal nonpoint management area and none on non-fish bearing streams in Oregon's coastal nonpoint management area. One ODF study in the coastal zone management area found positive detections in fish-bearing and drinking water streams after aerial application though they could not draw any conclusions about the EPA's effectiveness at protecting water quality for non-fish bearing streams. A 2010 USGS study found several detections of pesticides associated with urban stormwater, but the study was conducted outside the coastal zone management area. In recent paired watershed studies that have not been peer-reviewed, no samples were collected from a non-fish bearing stream segment that was directly under the application site. Therefore, there is a lack of data on the impacts of aerial application of herbicides on non-fish bearing streams in the coastal zone management area (Dent and Robben 2000 Study).<sup>29</sup>

Oregon relies on the national best management practices established through the federal FIFRA pesticide labels to protect non-fish bearing streams. Currently, EPA, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture are working to improve the national risk assessment process to include all ESA-listed species when registering all pesticides, including herbicides. Given the scale of this undertaking, the federal agencies are employing a phased, iterative approach over the next 15 years to make the changes, and it is expected that herbicide labels will not be updated until the end of the 15-year process. This ongoing federal process, however, should not preclude Oregon from making needed state-level improvements to how it manages herbicides in the context of its forestry landscape and sensitive species.

Oregon and other Pacific Northwest States have recognized the need to go beyond the national FIFRA label requirements to protect water quality and designated uses, aquatic species, including salmon, in their State.<sup>30</sup> Oregon has 60-foot spray buffers for non-biological insecticides and fungicides on non-fish bearing streams (OAR 629-620-400(7)) and 60-foot spray buffers for herbicides on wetlands, fish-bearing and drinking water streams (OAR 629-620-400(4)). Other Pacific Northwest states have established more stringent forestry spray buffer

<sup>28</sup> Kelly, V.J., C.W. Anderson, and K. Morgenstern. 2012. USGS and Eugene Water and Electric Board, Reconnaissance of Land-Use Sources of Pesticides in Drinking water, McKenzie River Basin, Oregon. Scientific Investigations Report 2012-5091.

<sup>29</sup> Dent L. and J. Robben. 2000. Oregon Department of Forestry Aerial Pesticide Application Monitoring Final Report. Oregon Department of Forestry, Pesticides Monitoring Program. Technical Report 7. March 2000.

<sup>30</sup> Peterson, E. EPA. 2011. Memo to Scott Downey, EPA and David Powers, EPA RE: Comparative Characterization of Pacific Northwest Forestry Requirements for Aerial Application of Pesticides. August 30, 2011.

**Comment [AC35]:** Is this a true statement? JW - page 7 of the report talks about inconsistency in forestry sampling. I've amended the language to make it more accurate.

**Comment [AC36]:** But if I recall these were below toxic levels so the fact that they detected them, really doesn't matter since it wasn't at toxic levels. Is there some other way we could summarize this study/results very succinctly that will not present a "leaning" conclusion that may imply (by the untrained reader) that any detection could be a bad thing.

**Comment [AC37]:** The coastal ZONE management area is different from the coastal NONPOINT management area. We need to be very careful about which term we use.

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## Ex. 5 - Attorney Client

**Comment [L39]:**

**Comment [AC40]:** This conclusory statement from Dent can't be applied to all the studies discussed in this para. It's placement here is very misleading and not a statement we would want to be making since Dent only made that conclusion based on their work. JW - I didn't look carefully at what you deleted, but the paragraph with no markups read ... [50]

## Ex. 5 - Attorney Client

### Ex. 5 - Attorney Client

**Comment [AC43]:** See revisions to other sections above that make a more explicit ... [53]

**Comment [JW44]:**

## Ex. 5 - Attorney Client

**Comment [L47]:** So the states does have buffer requirements on non-fish streams ... [56]

**Comment [AC48]:** Correct.

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requirements for herbicides along non-fish bearing streams. For example, Compared to neighboring coastal states and jurisdictions, Oregon has the smallest forestry specific water resource buffers for herbicides on non fish bearing streams. For smaller non-fish bearing streams, Washington maintains a 50-foot riparian and spray buffer (WAC-222-38-040). Idaho has riparian and spray buffers for non-fish bearing streams of 100 feet (IAR 20-02-01). California sets riparian buffers for non-fish bearing streams after consulting with the local forester, which implicitly restrict the aerial application of herbicides near the stream.

Though Oregon has neither spray nor riparian harvest buffers for herbicides that are aerially applied on non-fish bearing streams, the ODA Pesticide Division they requires applicators to attend trainings and obtain licenses prior to spraying pesticides. The training includes a review of regulations and requirements for protecting streams during aerial application. To reduce aerial drift, Oregon has guidance that instructs applicators to consider temperature, relative humidity, wind speed, and wind direction.

ODF requires pesticide applicators to complete a Notification of Operation notification form at least 15 days before applying on forestlands<sup>31</sup> and to maintain a daily chemical application form<sup>32</sup>ication. On the form, the applicators must list which pesticides may be applied, the stream segments on which these pesticides may be applied, and when application may occur within a 2-3 month period. However, the notification form does not specify when application will occur within a 1-2 week period, and post-application which pesticides were applied and how much. The form also reminds the applicator of the required spray buffers for fish-bearing and drinking water streams, but does not specify protections for -However, it does not non-fish bearing streams provide any reminders of other voluntary best practices included in the [insert proper name of state guidance discussed below] that should be followed.

With a lack of information about the specific impacts of herbicide spraying over non fish bearing streams in Oregon and the scientific literature that shows a potential for negative effects, EPA and NOAA recommend that spray buffers be established. At a minimum, Oregon needs to ensure that it is providing adequate protections for non fish bearing streams associated with the aerial application of herbicides.

Oregon has taken steps to provide more protection of non fish bearing streams during the aerial application of herbicides such as establishing an ODF notification form, requiring applicator training and licensior, and developing guidance on pesticide, including herbicide application and a Water Quality Pesticide Management Plan, and creating a Pesticide Stewardship Partnership program in this direction.

[NOTE: Did not rearrange because it would get too messy but would be more logical to talk about training/guidance first followed by ODF form. See edits below]

<sup>31</sup> <https://ferns.odf.state.or.us/E-Notification>

<sup>32</sup> Oregon Department of Forestry, "Daily Chemical Application Record Form," Revised September 2013, [http://www.oregon.gov/odf/privateforests/docs/ChemicalApplicationForm\\_Final.pdf](http://www.oregon.gov/odf/privateforests/docs/ChemicalApplicationForm_Final.pdf)

## Ex. 5 - Attorney Client

**Comment [AC51]:** I'm wondering if we should avoid making this explicit statement but just say that other states have these buffers. Anyone that's worth their salt can draw the conclusion that OR's are much weaker/non-existent. But this way, we avoid rubbing OR's nose in it in a public forum. We can make this direct connections in our follow up convos with the state.

**Comment [AC52]:** We need a citation for this.  
JW – got this from Erik Peterson, so will look for his citation.

**Comment [AC53]:** Do they also review recommended BMPs or just what is required? If they are just going over requirements, discussing the training provides no value to this rationale since we've already established that the requirements are not sufficient. ... [57]

**Comment [AC54]:** We need to cite th ... [58]

**Comment [AC55]:** This is out of plac ... [59]

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**Comment [AC56]:** If I recall, the blar ... [63]

**Comment [L57]:** Above para says nor ... [64]

**Comment [AC58]:** Or the ODF response?

**Comment [AC59]:** I assume this is tru ... [65]

## Ex. 5 - Deliberative

**Comment [AC61]:** See comment above.

**Comment [AC62]:** This is out of plac ... [67]

## Ex. 5 - Attorney Client

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ODF requires that all pesticide applicators complete a notification form. On the form, the applicators must list of potential which pesticides that may be applied, the stream segments on which these pesticides may be applied, and, when application may occur. The form also reminds the applicator of the, and a reminder of the applicable required spray buffers for fish-bearing and drinking water streams. While ODF's notification form specifically identifies guidance on spray buffers in the FPA, it is silent on Type N streams, presumably relying on FIFRA regulations. However, it does not provide any reminders of other voluntary best practices included in the [insert proper name of state guidance discussed below] that should be followed. ODF's notification form allows a full list of pesticides that the applicator may use, so it is difficult to determine which pesticide will be and is actually applied. ODF also works with ODA to require pesticide applicators to undergo training and obtain licenses prior to being allowed to spray pesticides. Part of the training includes a review of regulations and requirements for protecting streams during aerial application. To reduce aerial drift, Oregon has guidance that instructs applicators to consider temperature, relative humidity, wind speed, and wind direction. For pesticide monitoring, there is currently no monitoring for aerial application of herbicides on non-fish bearing streams in forestland in the coastal nonpoint management area. However, Oregon plans to increase monitoring pesticides on forestlands in the coastal nonpoint management area. Oregon agencies also regularly coordinate through the PARC.

Oregon's broader strategy for cross program coordination on pesticides includes its Oregon has taken independent steps to further address pesticide water quality issues. In 2007, key State agencies, including ODA, ODF, ODEQ, and the Oregon Health Authority, worked together to developed an interagency Water Quality Pesticide Management Plan, to guide State-wide and watershed-level actions to protect surface and groundwater from potential impacts of pesticides, including herbicides. The plan, approved by EPA Region 10 in 2011, focuses on using water quality monitoring data as the driver for adaptive management actions. The plan describes a continuum of management responses, ranging from voluntary to regulatory actions the state could take to address pesticide issues. If water quality concerns cannot be addressed through the collaborative, interagency effort, regulatory actions are taken using existing agency authorities.

As outlined in the plan, the State's Pesticide Stewardship Partnership (PSP) Pprogram, and Pesticide Analytical and Response Center (PARC), is the primary mechanism for addressing pesticide water quality issues at the watershed level. Through the partnership, the ODEQ works with State and local partners to collect and analyze water samples and use the data to focus technical assistance and best management practices on streams and pesticides that pose a potential aquatic life or human health impact.

NOAA and EPA acknowledge the progress Oregon has made in its establishment of a multi-agency management team, development of its Water Quality Pesticide Management Plan, and implementation of its PSP Pprogram to assess and manage pesticide water quality issues. However, as these efforts apply to the aerial application of herbicides in the coastal nonpoint management area, the federal agencies note that water quality monitoring data on pesticides is still limited in the State, and that Oregon has only established eight PSP monitoring areas in seven watersheds, none of which are within the coastal nonpoint management area. While

**Comment [AC64]:** Assuming this is in legislation? Then we should provide citation?

**Comment [AC65]:** If I recall, the blank form does't provide this reminder but the ODF State Foresterse response to teh form? If so, may be good to clarify.

**Comment [L66]:** Above para says nonfish as well

**Comment [AC67]:** Or the ODF response?

**Comment [AC68]:** I assume this is true but confirm. Does it reference the guidance anywhere on BMPs to follow?

**Comment [AC69]:** ODF responsibility is to ensure STATE requirements are being met. While I see the value in also reminding them of FIFRA, that is a fed requirement and not ODF's concern so I don't think we should be calling that out in this way.

**Comment [AC70]:** I've said this before but someone in one of our earlier calls about this noted that listing a lot of potential pesticides was a common practices for all states. Therefore we should not call this out as something that OR needs to change or we would be holding them to a higher standard than other states.

**Comment [AC71]:** Do they also review recommended BMPs or just what is required? If they are just going over requirements, discussing the training provides no value to this rationale since we've already established that the requirements are not sufficient. Therefore, the discussion of the training would need to be removed.

**Comment [AC72]:** We need to cite this and refer to it by its formal name.

**Comment [N73]:** Not a sentence . . .

**Comment [L74]:** Dropped sentence

**Comment [AC75]:** This is out of place here. Last sentence is incomplete.

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NOAA and EPA recognize that the PSP program targets the most problematic or potentially problematic watersheds, and Oregon received recent funding to expand into two new watersheds, the agencies believe that if monitoring data are to drive adaptive management, the State should develop and maintain more robust and targeted studies of the effectiveness of its pesticide monitoring and best management practices within the coastal nonpoint management area. ~~While not required as part of the management measures, the federal agencies encourage the State to design its monitoring program in consultation with EPA and NMFS so that it generates data that are also useful for EPA pesticide registration reviews and NMFS biological opinions that assess the impact of EPA label requirements on listed species.~~

**Ex. 5 - Attorney Client**

NOAA and EPA believe that Oregon could develop additional management measures for forestry that will protect non-fish bearing streams during the aerial application of herbicides to achieve water quality standards and protect designated uses through a variety of mechanisms. Some potential approaches could include one or more of the following elements:

- ~~In addition to a more robust, overall monitoring program for herbicides and other pesticides and to fully address the concerns NOAA and EPA raised in the 1998 conditional approval findings, Oregon may be able to achieve greater protection of non-fish bearing streams during the aerial application of herbicides through regulatory or voluntary approaches. An example of a regulatory approach would be to institute Adopt rules that would require spray buffers for the aerial application of herbicides along non-fish bearing streams similar to neighboring states. Oregon may wish to look toward spray buffer requirements neighboring states have established for ideas.~~
- ~~Adopt Another option would be to institute no-cut riparian buffers for timber harvest along non-fish bearing streams, which, by default, would also provide a buffer during the aerial application spraying.~~

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**Ex. 5 - Attorney Client**

**Comment [AC78]:** Would it have to be no-cut or could some sort of managed area also be acceptable? I don't know if they also spray over managed areas to keep weeds down.

~~Oregon could also institute voluntary programs backed by enforceable authorities. These voluntary efforts could build on existing programs. Elements of the voluntary program could include, but are not limited to the following:~~

- ~~Expand existing guidelines Develop more specific guidelines for voluntary buffers or buffer protections for the aerial application of herbicides on non-fish bearing streams.~~
- ~~Educate and train aerial applicators of herbicides on the new guidance and how to minimize aerial drift to waterways, including non-fish bearing streams, and surrounding communities.~~
- ~~Revise the ODF Notification of Operation form required prior to chemical applications on forestlands to include a check box for aerial applicators to indicate they must adhere to FIFRA labels for all stream types, including non-fish bearing streams;~~
- ~~Revise the ODF Notification of Operation form to refer applicators to the XXX guidelines for additional recommended best practices they should follow during application. - JW need to look into this, but good suggestion.~~
- ~~Track and evaluate the implementation of voluntary measures for the aerial application of herbicides along non-fish bearing streams and to assess the effectiveness of these practices, and if adjustments are needed, to protect achieve water quality standards and protect designated uses;~~

**Comment [AC79]:** Would be good to include specific name of guidelines (same ones we talked about in earlier para.)

**Comment [AC80]:** What do you mean by this? Beyond what BMPs are already in the guidance to minimize drift, etc? If so, may be helpful to provide an e.g.,

**Comment [AC81]:** Based on what we say in the previous para, they already provide training on this or am I missing something? If so, I would not include this piece.

**Comment [AC82]:** Very good and needed but alas, outside the scope of this add MM rationale.

**Comment [AC83]:** I don't this is done already but I could be wrong. If they expand the guidelines to include recommended spray buffer widths as well, would be extra valuable. JW - yes.

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- Conduct direct compliance monitoring for FIFRA label requirements related to aerial application of herbicides in forestry;
- Provide better maps of non-fish bearing streams and other sensitive sites and structures to increase awareness of these sensitive areas that need protection among the aerial applicator community; and
- Encourage the use of GPS technology, linked to maps of non-fish bearing streams, to automatically shut off nozzles before crossing non-fish bearing streams.

## Ex. 5 - Deliberative

**Comment [AC85]:** The state can't take this action but they can encourage applicators do so.

If Oregon chooses a voluntary approach, the State would also need to meet the other CZARA requirements for using voluntary, incentive-based programs as part of the sState's coastal nonpoint program. This includes a description of bing the process methods the state will use to monitor track and evaluate those voluntary programs, and track implementation of the voluntary practices, providing a legal opinion stating it has the necessary back-up authority to require implementation of the voluntary measures, and a description of the process that links the implementing agency with the enforcement agency, demonstrating and a commitment to use the existing enforcement authorities, where necessary that back-up authority.

[Note:

FYI: see some interesting weblinks on aerial application of herbicides and impacts to people on the Oregon coast. See legislation in the works on pesticides.

<http://www.hcn.org/issues/46.19/timberland-herbicide-spraying-sickens-a-community> - Nov. 10, 2014 article on forestry and herbicides.

<http://earthfix.opb.org/energy/article/legislation-in-works-for-oregon-herbicide-spraying/>

[http://www.pbs.org/newshour/bb/environment-july-dec12-forests\\_09-12/](http://www.pbs.org/newshour/bb/environment-july-dec12-forests_09-12/)

<http://www.theatlantic.com/national/archive/2012/08/in-oregon-residents-struggle-to-solve-a-pesticide-mystery/261083/2/>

## Ex. 5 - Attorney Client

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I know some commenters had said to not refer to the findings but I think its very important to provide that context that we noted this in the findings doc. Otherwise, the question would be where did you say this in 1998. We need to be clear.

*Jw- agreed*

The 1998 findings state that: "The rules do not contain restrictions for aerial application of herbicides, which would appear to leave type N streams still at risk" and call out our concern about the "adequacy of stream buffers during chemical application".

Therefore, I recommend we make a more general statement about the intent of the add MMs here...especially since not all of the actions we recommend at the end directly speak to "spray buffers" but all are aimed at achieving greater protection of non-fish bearing streams.

*Jw- agreed*

Is this in a document or series of policy statements? I believe it is, in which case it would be good to cite for consistency with the other items listed here.

*Jw – didn't get a chance to look at this one. I know the State has cited general BMPs in ODA then specified some in their March 20, 2014 submittal.*

I don't believe this is a complete citation. Needs to be fleshed out.

*JW – Allison, here's a link to the document. I don't see any publication numbers. We can also get Tetrattech to do this for references.*

*<http://www.oregon.gov/ODA/shared/Documents/Publications/PesticidesPARC/PesticideManagementPlanWaterQuality.pdf>*

Does this have something to site? Even a website explaining the program would be helpful.

*JW – I added a citation below for the Pesticide Stewardship Partnership.*

*<http://www.deq.state.or.us/wq/pubs/factsheets/community/pesticide.pdf>*

*They also have a website.*

Can we cite anything to support this statement

*JW – I could only get the abstract for this, so need to read the entire article. But even the abstract speaks to herbicides playing a big role in forestry management.*

*[http://www.readcube.com/articles/10.2193%2F0091-](http://www.readcube.com/articles/10.2193%2F0091-7648%282004%29032%5B1028%3ATROHFE%5D2.0.CO%3B2?r3_referer=wol&show_checkout=1&tracking_action=preview_click)*

*[7648%282004%29032%5B1028%3ATROHFE%5D2.0.CO%3B2?r3\\_referer=wol&show\\_checkout=1&tracking\\_action=preview\\_click](http://www.readcube.com/articles/10.2193%2F0091-7648%282004%29032%5B1028%3ATROHFE%5D2.0.CO%3B2?r3_referer=wol&show_checkout=1&tracking_action=preview_click)*



Add a few citations to support this statement---more recent studies that NMFS cited in BiOp? would be better than stuff from the 70s from the (g) guidance. Use footnote style that does not include researchers in the text of the doc.  
*jw - I'm working on getting citations for this sentence. I have general references, but I think recent ones would be better. Let's also include the 1991 Norris and S.V. Gregory which is pretty recent.*

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**Page 2: [39] Comment [AC10]** **Allison Castellan** **12/28/2014 5:43:00 PM**  
Provide citation or two that specifically supports this point. The same citation could be used to support both points, in which case, just include where C&D are listed. - *jw - sounds good. Will see what citations I get and whether both aerial drift and runoff are in the same literature.*

**Page 2: [40] Comment [JW11]** **Jenny Wu** **12/28/2014 5:45:00 PM**  
Jenny, include site-specific information about amount of herbicides that are aerially applied to demonstrate reasonably foreseeable, given Oregon information.

**Page 2: [41] Comment [AC12]** **Allison Castellan** **12/19/2014 4:29:00 PM**  
I liked this way of explaining the value of riparian buffers from earlier drafts. I don't recall anyone having a problem with it so wondering if we could bring it back. I found the current language a little confusing and lacking a clear explanation as to why riparian buffers can help.

*JW- sounds good to me, too. It reads clearly in this version. Don't remember why I changed it.*

**Page 2: [42] Comment [AC13]** **Allison Castellan** **12/28/2014 5:45:00 PM**  
As you note in the text, a citation or two that supports this point would be helpful. - *jw - will add these in*

**Page 3: [43] Comment [N17]** **NOSTEMP** **12/19/2014 4:29:00 PM**

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**Page 3: [44] Comment [AC19]** **Allison Castellan** **12/19/2014 4:29:00 PM**  
Delete web address from article in footnote. Inconsistent with other citations.  
*JW - added a couple of examples. Thx for making refs consistent.)*

**Page 3: [45] Comment [AC20]** **Allison Castellan** **12/19/2014 4:29:00 PM**  
Include citation? Does Richardson, et.al. address this too? I remember this was a statement in the BiOp but don't recall who they cited, if anyone.

**Page 3: [46] Comment [SS21]** **Stephen Sweeney** **12/19/2014 4:29:00 PM**

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**Page 4: [49] Comment [JW34]**

**Jenny Wu**

**12/28/2014 7:13:00 PM**

Note that the study talks about 3 type N streams that were sampled, but that all of these had riparian harvest buffers which the study acknowledges is not required. ""These Type N streams had overstory vegetative buffers, a practice not required for Type N streams." page 2. It gets complicated to go into detail about each other's studies, so I recommend we keep as is, so this is FYI.

**Page 5: [50] Comment [AC40]**

**Allison Castellan**

**12/19/2014 4:29:00 PM**

This conclusory statement from Dent can't be applied to all the studies discussed in this para. It's placement here is very misleading and not a statement we would want to be making since Dent only made that conclusion based on their work. *JW – I didn't look carefully at what you deleted, but the paragraph with no markups read smoothly.*

**Page 5: [51] Comment [SS41]**

**Stephen Sweeney**

**12/19/2014 4:29:00 PM**

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**Page 5: [52] Comment [SS42]**

**Stephen Sweeney**

**12/19/2014 4:29:00 PM**

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**Page 5: [53] Comment [AC43]**

**Allison Castellan**

**12/19/2014 4:29:00 PM**

See revisions to other sections above that make a more explicit supported finding that add MMs are needed because of the "reasonable foreseeable" threat to coastal waters, etc.

This statement is made to

**Page 5: [54] Comment [SS45]**

**Stephen Sweeney**

**12/19/2014 4:29:00 PM**

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**Page 5: [55] Comment [AC46]**

**Allison Castellan**

**12/19/2014 4:29:00 PM**

Need to respond to Steves' comments on NPDES. I'm not familiar.

*JW – I think Alan already looked into this, but I'll ask around.*

**Page 5: [56] Comment [L47]**

**Lynda**

**12/19/2014 4:29:00 PM**

So the states does have buffer requirements on non-fish streams for other insecticides and fungicides?? But not herbicides..?

**Page 6: [57] Comment [AC53]**

**Allison Castellan**

**12/28/2014 7:20:00 PM**

Do they also review recommended BMPs or just what is required? If they are just going over requirements, discussing the training provides no value to this rationale since we've already established that the requirements are not sufficient. Therefore, the discussion of the training would need to be removed. - *JW - okay. will take out.*

**Page 6: [58] Comment [AC54]**

**Allison Castellan**

**12/19/2014 4:29:00 PM**

We need to cite this and refer to it by its formal name.

**Page 6: [59] Comment [AC55]**

**Allison Castellan**

**12/19/2014 4:29:00 PM**

This is out of place here. Last sentence is incomplete.

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**Jenny Wu**

**12/28/2014 7:26:00 PM**

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**Jenny Wu**

**12/28/2014 7:26:00 PM**

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**Page 6: [63] Comment [AC56]**

**Allison Castellan**

**12/19/2014 4:29:00 PM**

If I recall, the blank form doesn't provide this reminder but the ODF State Forester's response to the form? If so, may be good to clarify.

**Page 6: [64] Comment [L57]**

**Lynda**

**12/19/2014 4:29:00 PM**

Above para says nonfish as well

**Page 6: [65] Comment [AC59]**

**Allison Castellan**

**12/28/2014 7:39:00 PM**

I assume this is true but confirm. Does it reference the guidance anywhere on BMPs to follow? - *JW - I can dig deeper, but maybe this is a simpler edit. Let me know what you think.*

**Page 6: [66] Comment [SS60]**

**Stephen Sweeney**

**12/19/2014 4:29:00 PM**

### **Ex. 5 - Attorney Client**

**Page 6: [67] Comment [AC62]**

**Allison Castellan**

**12/28/2014 7:39:00 PM**

This is out of place here. We've already stated they need better protections and should save discussion of specifically what OR needs to do to the end. - *JW - agreed.*

**Page 6: [68] Comment [N63]**

**NOSTEMP**

**12/28/2014 7:40:00 PM**

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**12/28/2014 7:43:00 PM**

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**Jenny Wu**

**12/28/2014 7:25:00 PM**

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